



**ENERGY STRATEGIC ISSUES PRESENTATION TO THE PORTFOLIO  
COMMITTEE ON ENERGY**

***By David Mahlobo, MP  
Minister of Energy***

**21 – 22 NOVEMBER 2017**



**energy**

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Department:  
Energy  
**REPUBLIC OF SOUTH AFRICA**

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# Introduction and Context



# Introduction and Context

- **Established in May 2009** – outcome of the split of the Department of Minerals and Energy into Department of Energy and Department of Mineral Resources..
  - **AIM:** Formulate energy policies, regulatory frameworks and legislation, and oversee their implementation to ensure energy security, promotion of environmentally friendly energy carriers and access to affordable and reliable energy for all South Africans.
  - The **Mission** of the DOE is to regulate and transform the energy sector for the provision of secure, sustainable and affordable energy.
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- The core business of the Department is premised amongst others the **National Energy Act, 2008 (Act No. 34 of 2008)** which, amongst others mandates the Department to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of **economic growth** and **poverty alleviation**, while taking into account **environmental management** requirements and interactions amongst economic sectors.
  - In carrying out this mandate, the Department **develops legislation**; undertakes **programmes** and **projects**; and in some instances, **transfer resources** to various implementing agencies and state owned entities (SOEs).
  - Key to this is the **Energy Mix Policy (Renewable and Non-Renewable Energy Sources-natural endowment)**

**VISION 2025: Improving our energy mix by having 30% of clean energy by 2025.**

# Key Legislation and Sector Planning

## Key Legislation

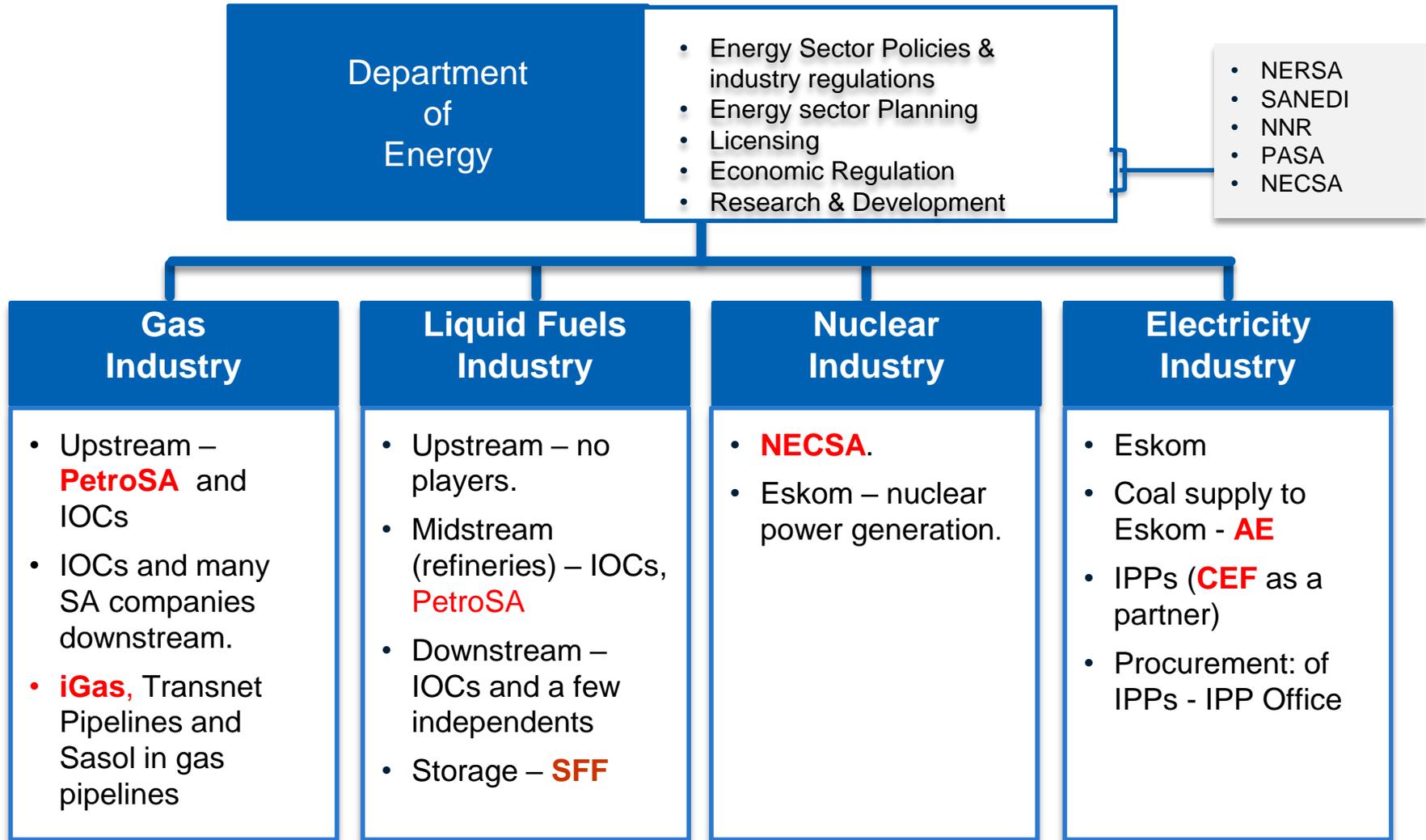
- › National Energy Act, 2008 (Act No. 34 of 2008);
- › Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended;
- › Petroleum Products Act, 1997 (Act No. 120 of 1977);
- › Central Energy Fund Act, 1977 (Act No. 38 of 1977), as amended;
- › Nuclear Energy Act, 1999 (Act No. 46 of 1999);
- › National Nuclear Regulator Act, 1999 (Act No. 47 of 1999); Gas Act, 2001 (Act No. 48 of 2008);
- › Electricity Act, 1987 (Act No. 41 of 1987), as amended
- › Petroleum Products Act, 1977
- › Petroleum Pipelines Act, 2003

## Sector Planning

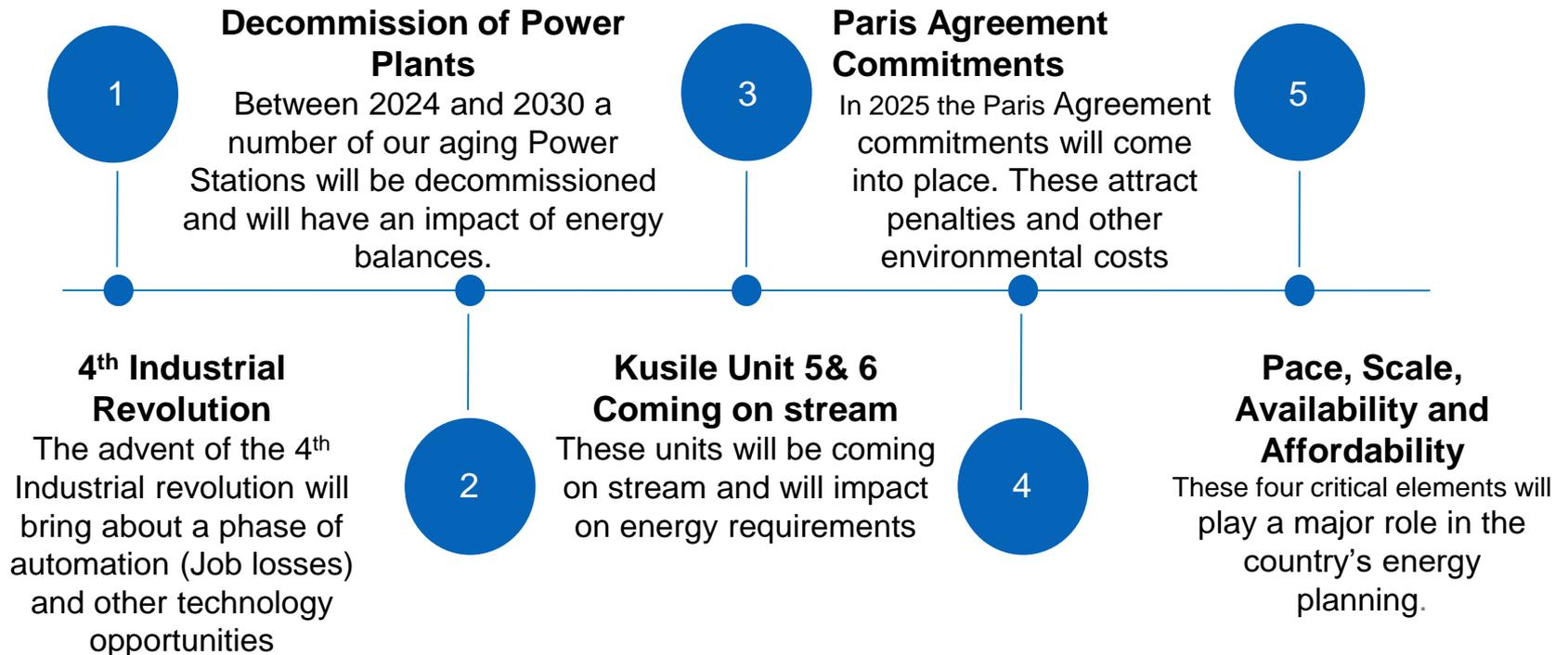
- › Integrated Resource Plan for Energy, 2010
- › Energy Security Master Plan, 2007
- › Draft Strategic Stocks Petroleum Policy and Integrated Energy Plan (draft)
- › Liquid Fuels Master Plan (draft)
- › Draft Gas Utilization Master Plan
- › National Development Plan of 2011
- › Nine point Plan

- The list is not exhaustive and only covers key legislation and sector planning elements
- There are a number key environmental consideration that impact the planning process such as **NEMA, National Climate Change** response white paper and the country's role as party to the **United National Framework Convention** on Climate Change.

# DOE & Subsidiaries



# Major Local Energy Developments 2017 -2030



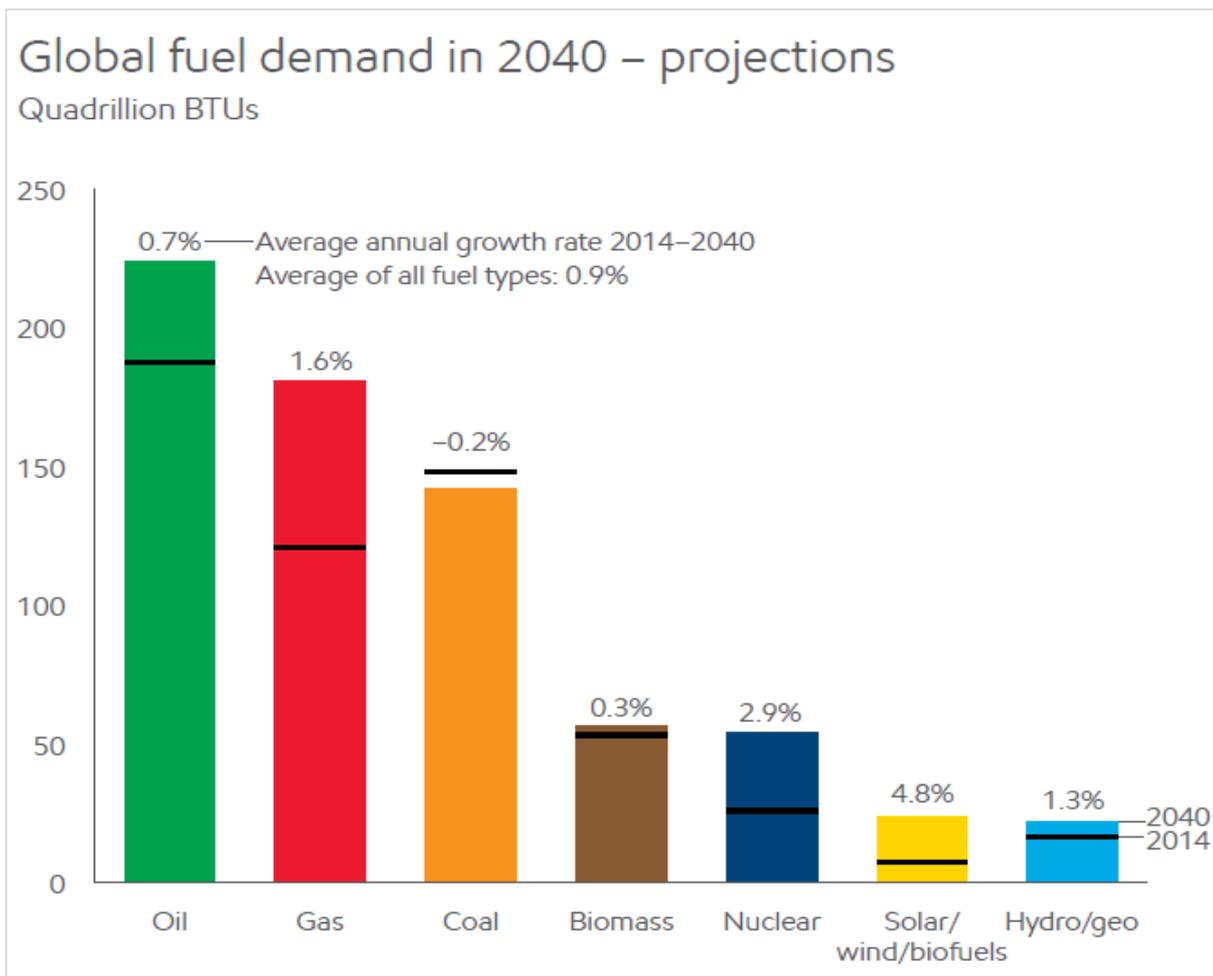
# Global and Local Energy Dynamics



# Other Key Environmental Considerations

Global Energy Sector Trends	Implications for SA
<ul style="list-style-type: none"> <li>☑ The impact of Greenhouse Gas Emissions on the environment remains a global concern and a challenge for the energy sector</li> </ul>	<ul style="list-style-type: none"> <li>☑ South Africa’s long term energy planning (IEP and IRP) will continue to favour low carbon emission technologies including nuclear, renewables and gas.</li> <li>☑ South Africa’s renewable energy sector is likely to grow.</li> <li>☑ Shale Gas potential remains a “game changer” for the country to decarbonise the energy sector.</li> </ul>
<ul style="list-style-type: none"> <li>☑ The liquefied natural gas (LNG) glut is expected to persist.</li> </ul>	<ul style="list-style-type: none"> <li>☑ Affordable LNG imports create an opportunity for the country to develop a gas market using imported gas. This gas market will act as a primer for domestic Shale Gas.</li> </ul>
<ul style="list-style-type: none"> <li>☑ Global demand for oil is expected to remain low while oil inventories remain high leading to “lower for longer” oil prices.</li> </ul>	<ul style="list-style-type: none"> <li>☑ Depressed oil prices will continue to pose a challenge for synthetic fuel production</li> <li>☑ Depressed oil prices negatively impact activity in upstream oil and gas exploration.</li> </ul>

# Global Energy Demand & Changes in future fuel mix -2040



The world's demand for energy is driven by mainly **population** and a rapid rise in urbanisation and increasing middle class is likely to increase energy consumption and **economic growth**.



- Fossil fuels remain the dominant source of energy powering the global economy, providing around 60% of energy growth
- **Natural gas** grows the most with its share in primary energy gradually increasing.
- **Oil** remains essential to transportation and chemicals
- **Coal** is projected to slow sharply with **gas replacing** it as the second-largest fuel source driven by need for cleaner fuel.
- Nuclear, **renewables see strong growth**; total more than 20%
- However the energy demand is reliant **sufficient infrastructure** to meet energy transportation, refining and storage needs to lower energy costs to consumers.
- More than half of the increase in global energy consumption is used for **power generation** as the long-run trend towards **global electrification** continues:

# Domestic Energy Sector Developments

Developments in South Africa's energy sector	Implications for the DOE
<ul style="list-style-type: none"> <li>☑ Clean Fuels 2 (CF2) Regulation</li> <li>☑ There is no new investment in refining capacity in spite of strong growth in liquid fuels demand.</li> <li>☑ Imports of liquid fuels finished products continue to increase, negatively impacting the country's balance of payments, compromising the opportunity to create jobs in refining activities.</li> </ul>	<ul style="list-style-type: none"> <li>☑ The NDP calls for a decision on the new refinery in South Africa in 2017. This is a good opportunity for CEF to play its strategic role in taking a lead in the industry towards CF2 migration</li> <li>☑ The DOE must lead the development of sustainable solutions that address capacity and quality challenges in the Refining sector. This may require strategic partnership as part of the broader energy strategy</li> </ul>
<ul style="list-style-type: none"> <li>☑ International Oil Companies (IOCs) are divesting from downstream liquid fuels investments.</li> </ul>	<ul style="list-style-type: none"> <li>☑ This creates an opportunity for DOE Entities to participate in downstream activities, accessing the wholesale profit margins of liquid fuels industry and for strategic partnerships.</li> </ul>
<ul style="list-style-type: none"> <li>☑ The RE IPP Procurement Programme is delayed due to protracted engagements on Power Purchase Agreements.</li> </ul>	<ul style="list-style-type: none"> <li>☑ The DOE is advocating for the 1500MW Solar Park should be structured appropriately to support local manufacturing of solar technologies in partnership with the SOEs.</li> </ul>
<ul style="list-style-type: none"> <li>☑ The Gas IPP Programme Procurement will commence in 2017 starting in Richard's Bay.</li> </ul>	<ul style="list-style-type: none"> <li>☑ The DOE is positioning itself to acquire skills and industry experience to drive Gas Programmes meaningfully with the objective of furthering government's objective of developing the gas market <b>through strategic partnerships</b>.</li> </ul>
<ul style="list-style-type: none"> <li>☑ Shale Gas exploration has been given a go ahead.</li> </ul>	<ul style="list-style-type: none"> <li>☑ Through <b>strategic partnerships</b> and the leveraging of the DOE's entities many years of experience in upstream gas exploration both on and offshore it is positioned to play a leading role in the development of SA's Shale resources in the Gas Infrastructure space.</li> </ul>

# National Energy Endowment Profile

Source	Total installed capacity
Coal	40,000 MW
Pumped Storage (Hydro)	1332 MW
Gas / Diesel	2,255 MW
Wind	103 MW
Renewable IPPs	3200 MW
Nuclear	1, 800 MW



# **Integrated Energy Plan (IEP) And INTEGRATED RESOURCE PLAN (IRP)**



# ENERGY INTEGRATED RESOURCE PLAN FOR REPUBLIC OF SOUTH AFRICA

- ✓ Integrated Resource Plan refers to the coordinated schedule for generation expansion and demand-side intervention programmes, taking into consideration multiple criteria to meet electricity demand. The IRP 2010-2030 was approved by Cabinet in March 2011.
- ✓ Historically in South Africa long term electricity infrastructure planning was very easy and predictable driven by population growth and GDP growth.
- ✓ There is now a decoupling of GDP growth from increase in electricity demand i.e. the relationship is no longer linear. This is because intensive energy users are now using more energy efficient technologies and the structure of the economy is changing less intensive energy industries e.g. services.
- ✓ Intensive energy users are now building their own generation plants, commercial buildings are moving towards roof-top power generation. Electricity demand from the national grid will become more difficult to estimate.
- ✓ This necessitates a more frequent revision of the IRP otherwise we may end up building infrastructure that will not be optimally used i.e. stranded assets.
- ✓ The low cost of smaller generation units makes it easy as we now do not have to build large units i.e. infrastructure build programmers must be implemented in a modular manner so that it can respond to changes in the market.

# ENERGY INTEGRATED RESOURCE PLAN FOR REPUBLIC OF SOUTH AFRICA

- ✓ The Revised Balanced Scenario (RBS) that was published in October 2010. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9, 6 GW; 6, 3 GW of coal; 11, 4 GW of renewables; and 11, 0 GW of other generation sources.
- ✓ The multi-criteria decision making process confirmed that this RBS represented an appropriate balance between the expectations of different stakeholder considering a number of key constraints and risks, for example:
  - I. Reducing carbon emissions;
  - II. New technology uncertainties such as costs, operability, lead time to build;
  - III. Water usage;
  - IV. Localization and job creation;
  - V. Southern African regional development and integration; and
  - VI. Security of supply.

## ENERGY INTEGRATED RESOURCE PLAN FOR REPUBLIC OF SOUTH AFRICA

- ✓ Several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear units by increase of 40% based on recent construction experience.

# ENERGY INTEGRATED RESOURCE PLAN FOR REPUBLIC OF SOUTH AFRICA

✓ Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

- I. The installation of renewables (solar PV, CSP and wind) has been brought forward in order to accelerate a local industry;
- II. To account for the uncertainties associated with the costs of renewables and fuels,
- III. a nuclear fleet of 9,6 GW is included in the IRP;
- IV. The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained;
- V. Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS

ENERGY SOURCE	COAL	NUCLEAR	HYDRO	GAS	PEAK Open Cycle Gas Turbine	RENEWABLES
YEAR 2010	90%	5%	5%	0%	Less than 0.1	0%
YEAR 2030	65%	20%	5%	1%	Less than 0.1	9%

**NB: This means energy share capacity in 2010, E=260TWh to 2030,**

# ENERGY INTEGRATED RESOURCE PLAN FOR REPUBLIC OF SOUTH AFRICA

- ✓ The IRP proposes development of new energy generation capacity in a manner that is taking into cognisance of affordability-cost optimisation; promote job creation, transformation and environment-mitigation of adverse climate changes.

# The Energy IRP Review

- ✓ The Integrated Resource Plan (IRP) is a living plan that is expected to be continuously revised and updated as necessitated by changing circumstances.
- ✓ There have been a number of developments in the energy sector, the country and the region, which necessitated the review and updating of the plan. Some of the changes are demand is lower than what was envisaged due to economic downturn, additional capacity, reduced plant performance, drought in certain parts of the SADC region, environmental obligations- Paris Declaration and changes in technology.
- ✓ The review of IRP is different from the 2010-2030 IRP. It is not zero based energy resource planning but use the existing IRP as the reference point.
- ✓ The objects of IRP 2010-2030 remains the same i.e. security of supply, affordable cost of electricity, job creation, localization, minimal negative environmental impact, minimal water usage, diversity of supply sources (energy mix) and promotion of energy access
- ✓ The review process considers i. settling key assumptions, ii. Developing a base-case, iii. Modelling and analysis scenarios iv. Final plan
- ✓ The revised IRP was approved by Cabinet for public consultation in October 2016. The revised IRP was subsequently gazetted in November 2016 for public comments and a departmental led process of consultation ensued in December 2016- March 2017 across the 9 provinces.
- ✓ The Department is concluding the Revised IRP for approval of Cabinet soon

# INTEGRATED ENERGY PLAN FOR SOUTH AFRICA

- ✓ Integrated Energy Plan refers to the over-arching co-ordinated energy plan combining the constraints and capabilities of alternative energy carriers to meet the country's energy needs as per the National Energy Act, 2008 (act 34 of 2008).
- ✓ The IEP provides the roadmap of future energy landscape for the country.
- ✓ It provides guidance on infrastructure investments opportunities and policy certainty.
- ✓ The IEP is based on macroeconomic environment, technological advances, environmental and climate change imperatives, national priorities and national interests.
- ✓ The IEP seeks to ensure :
  - i. Energy security of supply
  - ii. Affordability-minimise the cost of energy
  - iii. Job creation, localization and beneficiation
  - iv. Climate change-minimise negative impact to environment
  - v. Water conservation
  - vi. Energy mix-diversify supply sources and primary sources of energy
  - vii. Energy efficiency in the economy
  - viii. Increase access to energy

# Petroleum Oil and Gas



# Clean Fuels and Refinery Capacity

- ✓ South Africa, a net oil and gas importing country, we are however of the firm view that given the interest in our offshore acreage, we will soon be producers ourselves.
- ✓ There is growing optimism about the potential of Africa's oil and Gas development given the sustained increase in crude oil prices. This bodes well for many of the continent's economies that had suffered when there was a downturn in commodity prices.
- ✓ Net oil importing countries like ourselves have enjoyed the benefit of lower oil prices but were at the same time impacted by the downturn in other commodity prices such as iron ore and platinum group metals.
- ✓ Concerned that geopolitical rhetoric is once again having an impact on the price of oil other than normal market forces.
- ✓ Oil and gas are the world's most important and valuable commodities and constitute a major source of revenue for governments and corporations that control production and distribution.
- ✓ Many governments derive the bulk of their revenues from oil sales whilst many state owned corporations or private firms use this as a political, economic and security tool for influence. Control and ownership of this natural endowment also controls the revenue collection and allocation.
- ✓ This also translates into geopolitical clout for some and economic vulnerability for others.

# Clean Fuels and Refinery Capacity

- ✓ Many countries of the world are dependent on energy imports and nations with surpluses often exercise disproportionate influence on the world.
- ✓ Conflict or energy war is due to external risk involvement in their conflicts-whether in the form of direct intervention, arms transfers, the sending of military advisors or economic assistance.
- ✓ The struggle over energy resources has been a conspicuous factor in many recent conflicts. Looking closely once will see that at the heart of it all is the energy war.
- ✓ South Africa's National Development Plan (NDP), which is a detailed blueprint for how the country can eliminate poverty and reduce inequality by the year 2030.
- ✓ Amongst other things, it states that the energy sector will promote:
  - ✓ **Economic growth** and development through **adequate investment** in energy infrastructure and the provision of quality energy services that is competitively priced, reliable and efficient.
  - ✓ **Local production** of energy technologies will support job creation;
  - ✓ **Social equity** through expanded access to energy services, **with affordable tariffs** and well targeted and sustainable subsidies for needy households; and
  - ✓ **Environmental sustainability** through efforts to reduce pollution and to mitigate the effects of climate change.

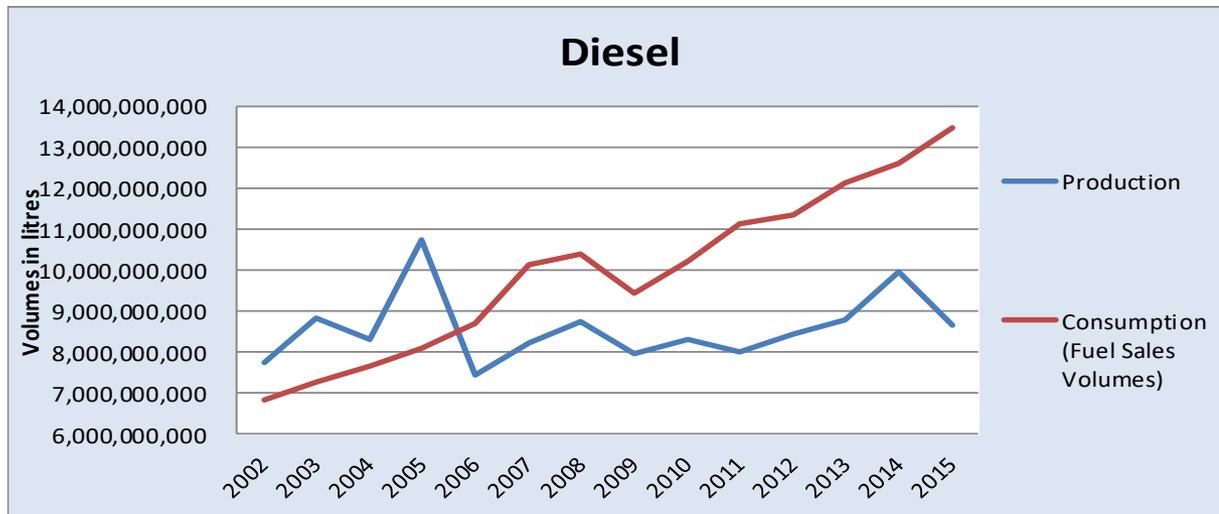
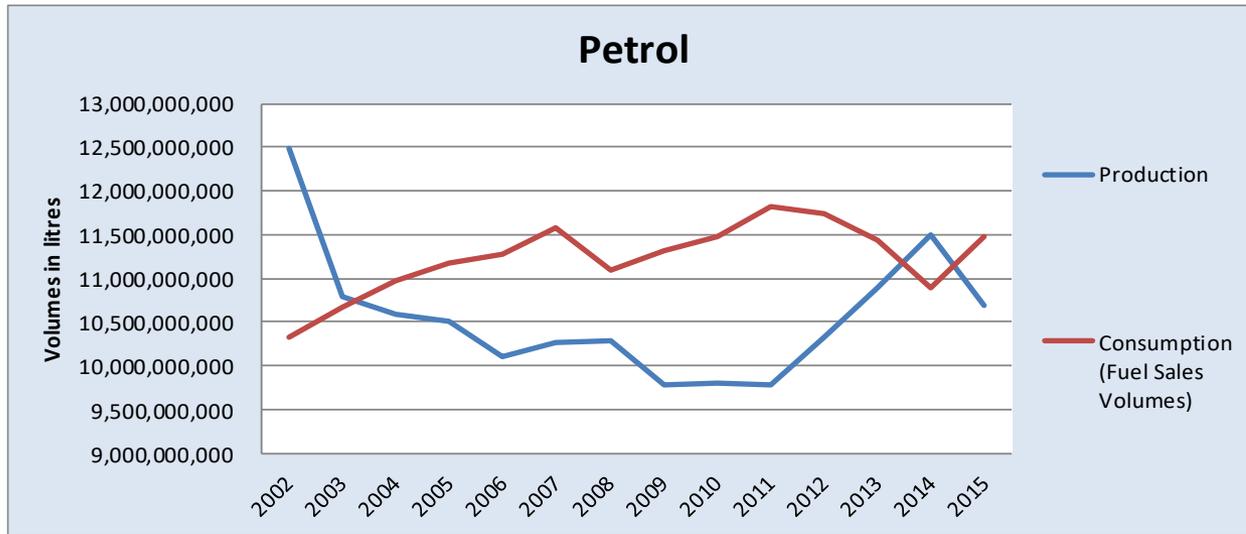
# Clean Fuels and Refinery Capacity

- ✓ Furthermore, the NDP envisages a South Africa which, by 2030, will have amongst other things, adequate supply of liquid fuels to avoid disruptions to economic activity, transport and welfare. The NDP proposes diversity by way of alternative energy resources and energy supply options, both in terms of power generation and the supply of liquid fuels.
- ✓ In as far as liquid fuels requirements are concerned, the NDP points out that South Africa face challenges with regard to existing refining capacity. Although the country has six refineries, four of which are crude oil refineries, our country imports an increasing share of refined products.
- ✓ South Africa is on Clean Fuels I which is equivalent to Euro III liquid fuels specification.
- ✓ South Africa wants to transition to Clean Fuels II specification which is equivalent to Euro V specification. This requires massive investments to convert the refineries to meet the new fuel specifications.
- ✓ Refinery owners want government to fund the upgrades or to allow them to recover the costs of the refinery upgrades after the upgrades have been commissioned. Government is reluctant as this is tantamount to the public investing into assets they do not own. (The cost of the upgrades is estimated at over R40bn and 24 billion Litres of liquid fuels are sold annually, so this can be partially funded through some type of levy).

# Clean Fuels and Refinery Capacity

- ✓ Building a new refinery of **400 000bd** is estimated at (As at 2010) **\$10bn that** can be structured **senior debt and equity rather than spending** in subsidising oil companies infrastructure upgrades from CFI to CFII which is an equivalent of euro IV standard
- ✓ South Africa's **petrol and diesel prices** are calculated based on the import parity principle for equivalent grades of product available in **Europe, Saudi Arabia** and Singapore. The South Africa prices are therefore based on **costs of a Euro V refinery**, hence the government's reluctance to allow additional cost recovery for refinery upgrades. There is an argument that it is more economically beneficial to have a levy for a new refinery than for refinery upgrades.
- ✓ Suggestion for point above: South Africa needs to compare the option of **importing vs. local production**. Local production is aligned to national objective to re-industrialise and beneficiate raw materials locally.
- ✓ South Africa **has not invested in** new refining capacity over the last 20 years. As a result, South Africa now imports more than 10% of its liquid fuels demand and the share of imports is growing.

# Clean Fuels and Refinery Capacity



# Clean Fuels and Refinery Capacity

- ✓ Some Refinery owners in South Africa want to exit the refining business citing the high costs of upgrading the refineries to meet the new specification. Other refinery owners are considering only importing refined products to meet their market share and using the refinery facilities as storage terminals.
- ✓ South Africa is at a tipping point regarding its refining capabilities. There is a risk of serious, severe job losses and South Africa losing its competitive advantage in the continent.
- ✓ South Africa's national oil company (PetroSA) is currently insignificant and cannot be used to drive the national objectives. See diagram below.

# Clean Fuels and Refinery Capacity

Integrated Oil Company							
Refinery Capabilities	100 000	90 000	90 000	45 000	125 000	39 000	220 000
Retail Presence	Yes	Yes	Yes	No	Yes	Yes	Yes
Commercial Presence	Yes	Yes	Yes	Limited	Yes	Yes	Yes
Lubricants	Yes	Yes	Yes	No	Yes	Yes	Yes
Speciality Products	Yes	Yes	Yes	No	Yes	Yes	Yes
Extensive Depot Network	Yes	Yes	Yes	Limited	Yes	Yes	Yes
On road fuelling capability	Yes	Yes	Yes	No	Yes	Yes	Yes

Given the need for security of energy supply and further transportation of the downstream industry much more needs to be done to capacitate PetroSA to be able to play across the entire value chain.

# Clean Fuels and Refinery Capacity

## Policy Options

- ✓ In partnership with BRICS national oil companies South Africa must build a new refinery to supply the domestic and regional market. New Refinery needs to have access to the market.
- ✓ Such a mega infrastructure project will support other industries in the country and also create new jobs.
- ✓ The policy decision to build or not to build a new refinery is pronounced through the Integrated Energy Plan (IEP).
  
- ✓ In addition to making a policy decision regarding the refining capacity of the country, there needs to be a policy decision on the single buoy mooring (“SBM”) which is a facility for pumping oil from vessels into the Durban port. The SBM is owned by Shell, BP, Engen, Sasol and Total. While the SBM operates on “open access” market principles, the government cannot impose decisions on its operations even if such decisions are in the public interest.

# Renewable Energy And Independent Power Producers



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# Renewable Energy And Independent Power Producers

- ✓ IPPs-The government contracts to purchase power at a given tariff. Any cost overruns on building or maintenance do not affect future tariffs.
- ✓ Electricity users only start to pay for the infrastructure when the IPP delivers the electricity.
- ✓ The rationale for signing of the REIPPPP Bid Windows 3.5 and 4 projects, by indicating the benefits of these projects while highlighting associated risks of delaying cancelling the signing of the project agreements.
- ✓ South Africa, similar to other countries in the world, is determining its electricity generation capacity path based not only on the pace, structure and outlook for economic expansion, electricity needs, the existing and expected costs and efficiencies of different technologies, but also on affordability to the country and its consumers, availability and sustainability of the resource, contribution to the economy, impact and on the future of the generations to come taking into account the country's commitments to reduce Greenhouse Gas Emissions (notably carbon dioxide – CO<sub>2</sub>), the country's climatic conditions and water availability; as well as the nature and levels of socio-economic development and fiscal considerations.

# Renewable Energy And Independent Power Producers

- ✓ Whilst the public sector energy generation is:
  - I. Infrastructure programme can be designed to achieve certain socio-economic objectives.
  - II. Excess capacity can be used by the government to catalyse new industries.
  - III. Utility starts to include costs of building the infrastructure even before generating the power e.g. the utility starts to include interest during construction, project development costs in its tariffs.
  - IV. Cost overruns are passed through to the consumer
- ✓ It is within this context and with the urgent drive of showing SA's progress on climate change commitments by December 2011 as well as the need for adequate, reliable and affordable electricity generation capacity during a time of electricity blackouts, that the Government of South Africa launched the Independent Power Producers Procurement Programme (IPPPP) with renewable energy technologies.

# Renewable Energy And Independent Power Producers

- ✓ The REIPPPP is as relevant today as it was at the time of its launch in 2011 and its design and implementation has proved that it is giving effect to all national and energy policy and planning objectives as elaborated in e.g.
  - I. the National Development Plan (NDP),
  - II. the White Paper on Energy Policy of South Africa 1998,
  - III. the Integrated Energy Plan (IEP) of 2016, the various Integrated Resources Plans (IRP) since 2010 to
  - IV. the latest, strategic infrastructure and industrialisations plans and accords such as Green Economy and Youth Accords between government, labour, business and civil society. Notably achievement against the collective aspirations of the Green Economy Accord.

# Renewable Energy And Independent Power Producers

- ✓ To date, this has been mainly achieved **through the implementation** of the REIPPPP structured to multiply benefits for job creation and enterprise development (with a focus on women and youth) and local manufacturing opportunities. However, as with most successful initiatives, lessons learnt and the experience gained should be applied to new initiatives to ensure the improvement of future programmes and adjustment of the programmes to support the objectives and implementation of the policies of the Country.
- ✓ In essence, the outcomes of the REIPPPP are not only **generation of electricity** but include also tangible and positive outcomes such as:
  - ✓ **cash-flows to the communities** in the surrounding areas of the projects for the duration of the power purchase agreements;
  - ✓ **radical economic transformation** by allowing previously disadvantaged groups opportunities to enter mainstream economic activities;
  - ✓ **impact throughout the economy**, including both macro-economic investment and grass roots socio-economic and entrepreneurial development and empowerment in rural areas;
  - ✓ **Allowing flexibility** in and distribution of electricity generation during a time when the energy sector, worldwide, is in a transformation phase.

# Renewable Energy And Independent Power Producers

- ✓ The REIPPPP presents South Africa as a global investment destination of choice. The REIPPPP has, to date, attracted R200 billion in local and foreign direct investment in energy infrastructure assets of which the 27 projects to be signed will contribute R55.92 billion, thus contributing to the improvement of much needed economic growth, investor confidence, investment in economic infrastructure, job creation, manufacturing and socio-economic benefits.
- ✓ IPPs play an important part in providing new electricity generation capacity
- ✓ Implementation of energy options will be guided by pace, scale and affordability

# NUCLEAR ENERGY

- ✓ The nuclear industry has over decades been an integral part of the world economic development, evolving from import to export oriented industry, providing a central impetus to technological innovation as well as to socio-economy developments such as infrastructure, health and education.
- ✓ The multifaceted nature of the energy policy requires for factors such as economic, social and environmental concerns to be considered in energy planning. There are therefore different sets of variables that inform energy planning nationally, regionally and globally and there cannot be a one-source fits all approach
- ✓ We are the first country to voluntarily disarm our nuclear weapons programme in the early 1990s, and more recently received an international award for being the first to convert our SAFARI-1 research reactor and medical isotope production through the use proliferation resistant nuclear fuel.
- ✓ South Africa is of the firm view that there are no safe hands for Weapons of Mass Destruction. The only viable solution to the problems of nuclear weapons is their total elimination as expressed in the recently UN adopted Treaty banning Nuclear Weapons.

# NUCLEAR ENERGY

- ✓ This is the view expressed by HE President Zuma at when he addressed the Un General Council in last month. He said, and I quote: “ It can no longer be acceptable that some few countries keep arsenals and stockpiles of nuclear weapons as part of their strategic defence and security doctrine, while expecting others to remain at their mercy. We are concerned that any possible accidental detonation would lead to a disaster of epic proportions. We continue to make a clarion call to all Member States of the UN to sign and ratify the Ban Treaty in order to rid the World and humanity of these lethal Weapons of Mass Destruction. We reaffirm, at the same time, the inalienable rights of states to peaceful uses of nuclear energy as reinforced in the Non Proliferation Treaty”.
- ✓ Cape Town is home to the Koeberg Nuclear Power Station, the only one on the African continent.
- ✓ The Department of Environmental Affairs has recently issued a positive record of decision for Eskom to proceed with an Environmental Impact Assessment into the suitability of the same site to host 4000 MW of nuclear generated electricity.
- ✓ South Africa recognises the role of nuclear power in ensuring security of energy supply and meeting the challenge of climate change. We promote an energy mix of coal, gas, renewables and nuclear. Each of these options has their role; some of the energy sources are intermittent supply and while others, such as nuclear and coal, are base-load supply.

# NUCLEAR ENERGY

- ✓ South Africa has made a policy decision to pursue nuclear energy as part of the energy mix and recognise the role of nuclear as a base-load source of energy in ensuring security of supply and climate change mitigation. Currently, nuclear constitutes about 6% of the South African energy mix – with 1 800 Megawatt electric of electricity supplied to the national grid by the Koeberg Nuclear Power Station in the Western Cape. The approved Integrated Resource Plan of 2010-30 provides for coal, gas, renewables and 9600 Megawatt nuclear as part of the energy landscape by 2030.
- ✓ Being a developing country, our key driver to our policy decision for nuclear power is the economics of the energy source. Currently Koeberg is one of our lowest cost electricity sources, and generation III nuclear power plants remain a good economic choice for South Africa. Generation IV nuclear power plants promise improved economics and South Africa looks forward to deploying such advanced energy systems for its development.
- ✓ Being a committed party to the Paris Convention, South Africa has set ambitious carbon reduction targets, which Generation IV reactors will continue the tradition of nuclear power being the lowest carbon emitter from all energy sources. With the advent of reduced waste from these systems, there is no doubt that nuclear power itself will be more sustainable than ever.

# NUCLEAR ENERGY

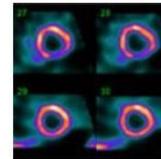
- ✓ One of the most important facets of nuclear power is – Safety. With most of the reactors globally still being Generation II, South Africa has taken a decision to deploying only Generation III or above type technology going forward.
- ✓ Nuclear power continues to be the safest source of electricity. The further improved safety of Generation IV systems will surpass this benchmark, and hopefully cure the myth that nuclear is an unsafe source of energy.
- ✓ South Africa previously embarked on a Generation IV type reactor project known as the Pebble Bed Modular Reactor. This project was put into care and maintenance in 2010, however, we remain interested to still deploy such technology into the future. At this stage, we are focusing on readily deployable technologies to address our electricity demand needs going into the future as our coal fired power plants become decommissioned.
- ✓ It is our responsibility as this current generation to produce knowledge systems that enhances the sustainable use of nuclear power to drive a developmental agenda and bequeath to the next generation a world they are proud to call home.

# Nuclear Applications

## 1. Industrial applications



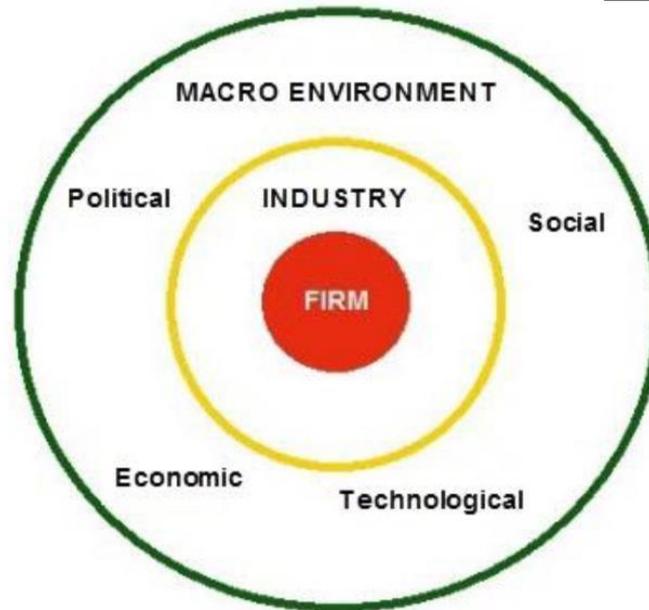
## 2. Medical diagnostics and therapy



## 3. Materials beneficiation



## 7. Clean energy



## 4. Nuclear waste



## 6. Manufacturing



## 5. Non proliferation of nuclear materials



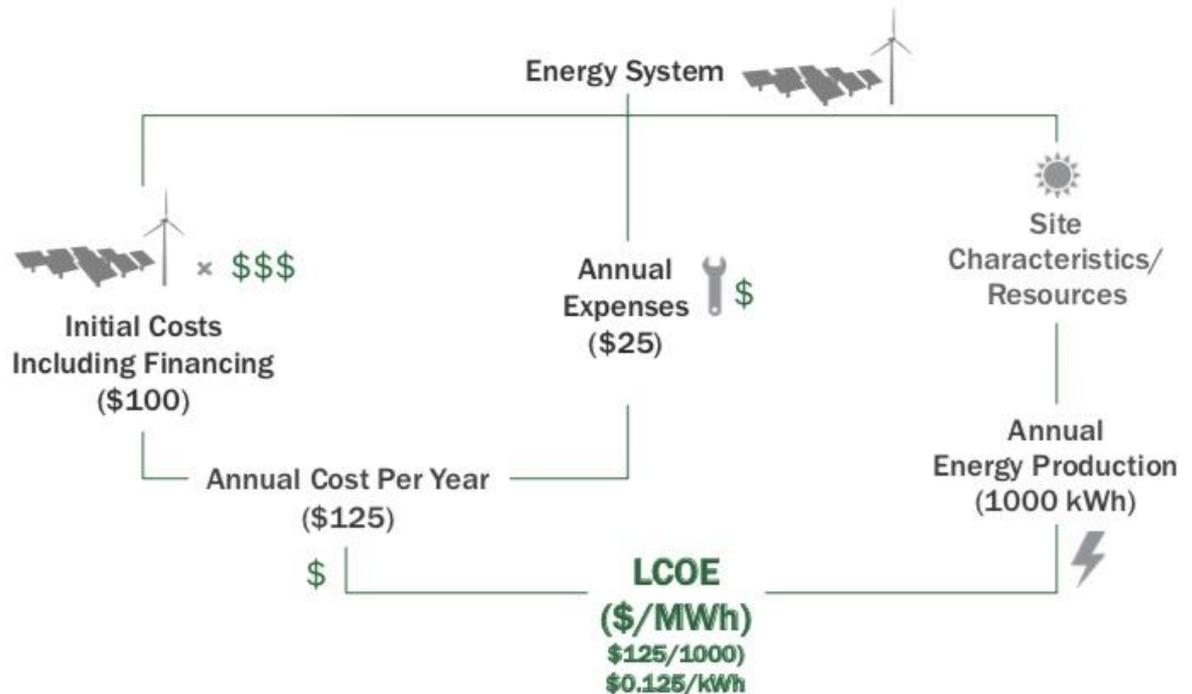
# ENERGY COSTS

- ✓ Energy is the catalyst and enabler of economic growth, peace, stability and development
- ✓ The costs of energy should be affordable to the poorest of the poor but competitive to promote growth and boost investor confidence
- ✓ South Africa has strong regulatory mechanism to ensure predictability of energy costs
- ✓ The implementation framework of pace, scale, affordability and climate change has a bearing of energy costs
- ✓ The cost of energy must be assess as a whole throughout the energy value chain to avoid any distortion. Use the mantra from cradle to grave i.e. source, infrastructure built, operations and maintenance, decommissioning
- ✓ We need to also look at at grid-based power and off-grid power

# Levelized Cost of Energy

- ✓ Measures lifetime costs dividend by energy production
- ✓ Calculates present value of the total cost of building and operating a power plant over an assumed lifetime.
- ✓ Allows the comparison of different technologies ( wind, solar, natural gas, ) of unequal lifespans, project sizes, different capital costs, risks, return and capacities.
- ✓ Critical to making an informed decision to proceed with development for a facility, community or commercial scale project.

## Simple LCOE Concept



Adapted from European Wind Energy Association, "Economics of Wind Energy," [http://www.ewea.org/fileadmin/ewea\\_documents/documents/00\\_POLICY\\_document/Economics\\_of\\_Wind\\_Energy\\_March\\_2009.pdf](http://www.ewea.org/fileadmin/ewea_documents/documents/00_POLICY_document/Economics_of_Wind_Energy_March_2009.pdf)

# ENERGY COSTS

- ✓ We need to discuss the possibility of off-grid power that can be used for various settings i.e, renewables in rural settings or certain specific industrial settings- but where it is applied there has to be a return on investment
- ✓ On grid power must be reliable and affordable to harness and boost investment
- ✓ We need to respond to: what is the cost of electricity; what does the nuclear power cost, wind and solar power cost, gas turbines and pumped storage cost;
- ✓ what does it cost the country premium is if no additional capacity in planned and introduced
- ✓ The cost in our country is primarily determined by cost of coal-fired power system because of size and contribution-in the main it is our benchmark. The source of energy wrt to coal is mainly in the far north east-implication the distance of electricity transmission has implications to cost in real terms at the point of same
- ✓ The cost of nuclear is currently less than the cost of most of the coal fired electricity

# ENERGY COSTS

- ✓ Solar and wind power prices were expensive but now coming down but it constitute a very small percentage of the total power generated. This form of energy is intermittent and unpredictable for base industrial operations

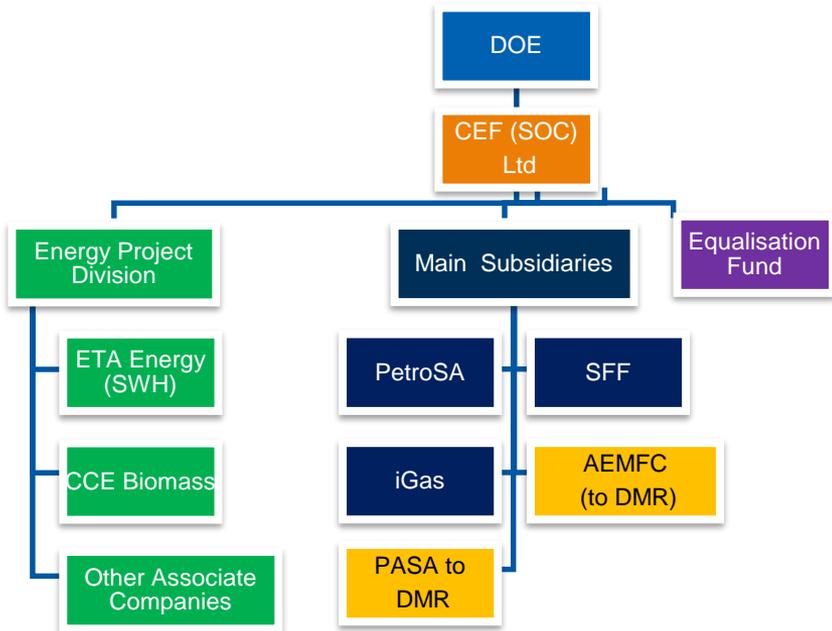
# Repositioning Of Central Energy Fund



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# Central Energy Fund



▪ The **Mandate** of CEF is derived from the CEF Act (No 38 of 1977). The mandate is in essence to contribute to the security of energy supply for the country as the implementing arm of the DOE in support of energy sector goals and government’s broad strategic objectives (NDP).

▪ **Role of CEF:** Search for appropriate energy solutions to meet the *future energy needs* of South Africa, the Southern African Development Community and the sub-Saharan African region, including oil, gas, electrical power, solar energy, low-smoke fuels, biomass, wind and renewable energy sources

# Overview of Group Central Energy Fund



# Overview of Group Central Energy Fund

## Resources and Capabilities of the Group

- Review of **tangible, intangible** and human resources and capabilities in matching Group strategy to the opportunities that arise in the **external environment** across the value chain.
- Design high level **organizational organizational structure** in line with revised Group business model and strategy requirements.
- Strategic link to support DOE initiatives

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## Business Operations & Future prospects

- End to end review of core **operations functions** and activities to identify and scope **opportunities of operational improvement** and **synergy optimization**.
- Identify key **business processes and interfaces** (people, systems & processes)
- Define opportunities for **cost** and **revenue** optimization.
- **Outside in** and **Inside out** view of the business and looking at other complementary businesses that may reside outside the Group for **possible integration** or **acquisition**.

# Conclusion

- ✓ Over the past couple of months the DOE has been busy with a number of initiatives for addressing a plethora of strategic challenges as part of our key core focus areas and improving strategic relevance.
- ✓ We continue to make steady progress in resolving a number of legacy issues in relation to governance, commercial sustainability and overall alignment.
- ✓ In the coming four months the entities will be going through a detailed strategy review and analysis process that will cover the entire value chain to strengthen our role in the Energy sector.
- ✓ As we conduct this important piece of work we are confident that we will emerge with a clearer roadmap for **strategic relevance**, efficient **governance structures**, **engaged workforce** fit for purpose Group **Operating Model**, diversification of **revenue streams** and a more impactful contribution towards developmental objectives in support of NDP.
- ✓ As we move forward we are cognizant of the need to excel on the initiatives that support the **business of today** so that we remain commercial viable whilst pursuing bold objectives that will define the **business of tomorrow** to benefit South Africa as a whole

**END**



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